

We claim:

1           1. A method of grounding a metal tube surrounded by an  
2        electrically nonconductive plastic layer to a metal part which  
3        comprises the steps of:

4           (a) providing a clip at least in part composed of a  
5        plastic which has been made electrically conductive and having a  
6        penetrating portion;

7           (b) applying said clip to the metal tube surrounded by  
8        the electrically nonconductive plastic layer and pressing said  
9        penetrating portion through said plastic layer into direct  
10      electrically conducting contact with the metal tube;

11           (c) thereafter welding said clip to said plastic layer;  
12      and

13           (d) electrically connecting said clip to said metal  
14      part.

1           2. The method defined in claim 1 wherein said metal  
2        part is a chassis of a motor vehicle and said metal tube serves  
3        to conduct a liquid or a gas on said vehicle, said penetrating  
4        portion being fabricated with one or more projections adapted to  
5        penetrate said layer.

1                   3. The method defined in claim 2 wherein said clip is  
2 welded to said plastic layer by a rotational welding.

1                   4. The method defined in claim 2 wherein said clip is  
2 welded to said plastic layer by ultrasonic welding.

1                   5. The method defined in claim 2 wherein said clip is  
2 welded to said plastic layer by vibrational welding.

1                   6. The method defined in claim 2 wherein said clip is  
2 welded to said plastic layer by induction welding.

1                   7. The method defined in claim 2 wherein said clip is  
2 made electrically conductive by the incorporation of metal fibers  
3 in the plastic thereof.

1                   8. The method defined in claim 7, further comprising  
2 reinforcing said clip by incorporating glass fibers therein.

1                   9. A clip for grounding a metal tube surrounded by an  
2    electrically nonconductive plastic layer to a metal part which  
3    comprises a clip body having a penetrating portion and composed  
4    at least in part of a plastic whereby, upon application of said  
5    clip to the metal tube surrounded by the electrically  
6    nonconductive plastic layer and pressing of said penetrating  
7    portion through said plastic layer into direct electrically  
8    conducting contact with the metal tube, said clip can thereafter  
9    be welded to said plastic layer and electrically connected to  
10   said metal part.

1                   10. The clip according to claim 9 which has a sleeve  
2    portion adapted to extend more than 180° around said tube.

1                   11. The clip according to claim 9 wherein the plastic  
2    of said clip is the same as the plastic of said layer.

1                   12. The clip defined in claim 9 wherein said portions  
2    consist essentially of a plastic to which metal fibers have been  
3    added to make the plastic of the clip electrically conductive.

1                   13. The clip defined in claim 12 wherein glass fibers  
2 are added as a reinforcement to the clip.

1                   14. The clip as defined in claim 12 wherein said metal  
2 fibers are steel fibers.

1                   15. The clip as defined in claim 9 wherein said  
2 projecting portion is formed by triangular section or trapezoidal  
3 section projections or teeth.

1                   16. An automotive duct assembly comprising:  
2                   a metal automotive vehicle chassis;  
3                   a metal tube extending along said chassis and adapted  
4 to conduct an automotive fluid, said tube having a plastic  
5 nonconductive layer on an exterior thereof; and  
6                   a clip grounding said metal tube surrounded by said  
7 electrically nonconductive plastic layer to said chassis, said  
8 clip comprising a clip body having a penetrating portion and  
9 composed at least in part and applied to the metal tube  
10 surrounded by the electrically nonconductive plastic layer and  
11 having said penetrating portion pressed through said plastic  
12 layer into direct electrically conducting contact with the metal

13        tube, said clip being welded to said plastic layer and  
14        electrically connected to said metal part.

1                17. The automotive duct assembly defined in claim 16  
2        wherein said clip body is a split ring consisting of a  
3        thermoplastic material in which metal fibers are disbursed and  
4        said penetrating portion comprises a plurality of projections of  
5        triangular or trapezoidal cross section capable of pressing  
6        through said plastic layer, said clip body being compressed  
around said metal tube.